STATUS & SURVIVAL OF NZ BROWN TEAL *(Anas chlorotis)*

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INTRODUCTION

Like all endemic New Zealand birds the NZ Brown teal *(Anas chlorotis)*, or Pateke (Maori for brown teal), is believed to have evolved from the very beginning of life in New Zealand and Pateke have colour, body shape, egg size, vocal sound and many behavioural features unique to dabbling ducks *(Hayes 2010)*.

There is growing evidence to support the theory that; Pateke, NZ Blue duck *(Hymenolaimus malacorhynchos),* NZ Scaup *(Aythya novaeseelandiae),* NZ Paradise Shelduck *((Tadorna variegata)*, together with Campbell Island Teal *(Anas nesistis)* and Auckland Island Teal *(Anas aucklandica*), all evolved after New Zealand's separation from what is now Australia c85,000,000 years ago, together with a variety of other unique endemic birds *(Hayes 2010)*. Endemic New Zealand birds are indeed evolutionary relics *(Halliday 1978).*

Brown teal *(Anas chlorotis),* now commonly referred to as Pateke, have been under threat of premature extinction *(extinction influenced by humans)* since Europeans started arriving in New Zealand in the 1840's; accompanied then, and later, by rats, cats, dogs, ferrets, stoats, weasels and hedgehogs; all of which found the country's endemic birds far easier to kill and probably more palatable than imported rabbits, hares, possums, mallards, black swan, geese, and so on!

These alien predators also enjoy devouring the eggs of all birds and so wreaked havoc amongst the New Zealand's endemic birds, this being well recognised as early as the mid-1850's *(Druett 1983, King 1984, Hayes 1994, 2002 & 2010)*.

To add to the impact of introduced mammalian Pateke predators, the past 20-years has revealed compelling visual evidence, that the ever expanding populations of Australasian Harrier *(Circus approximans)* and Pukeko *((Porphyrio porphyrio)* are also adversely influencing the survival of Pateke ducklings and adults *(Hayes 2002 & 2010)*.

Both the harrier and pukeko are Australian migrant birds and believed to have only established themselves in New Zealand as recently as only 1,000-years ago *(Worthy & Holdaway 1996).*

European immigrants also bought with them their sporting firearms and by far the biggest predator of the country's wildlife were people, and it is not 'by accident' that New Zealand holds the world record for having the most endangered birds *(2002 Hayes)* .

Until as recently as 2000 many involved with Pateke survival chose to refute the impact of predation on Pateke, even though, by c2000, several endemic New Zealand birds had been saved from the brink of extinction by controlling/eliminating two major predators, rats and cats *(Butler & Merton 1992)*.

Duck hunting has also had a major impact on Pateke survival and in spite of being accorded legal protection from hunting in 1921 many captive reared Pateke released into the wild have been shot during the hunting season.

Until 1990, when wetlands were accorded legal protection, wetland destruction was rampant from those early days of colonisation and this, in association with predation and duck hunting, impacted heavily on Pateke survival.

Prior to the protective measures introduced in 1990 c70% of New Zealand once vast wetlands and c50% of New Zealand indigenous forests, that once covered the whole country, had been eliminated.

In 2010 the impact of the harrier on endemic birds was recognised by the Dept of Conservation and in 2012 the New Zealand Wildlife Act was amended to eliminate partial protection of the harrier in areas where rare, native, threatened or endangered New Zealand wildlife exist, so that the harrier can be legally culled at sites that support such wildlife.

When Europeans first arrived in New Zealand the harrier population was comparatively low, but the bird benefitted from forest clearance and grew to alarming proportions and to a guesstimated population of 5-7 million, but very questionable partial legal protection of the harrier was introduced in 1986; questionable because between 1920 and 1960 the NZ Acclimatisation Society movement eliminated well over 500,000 harriers, not without good reason; because this was during the period when the Society movement, was attempting to establish gamebirds - such as; mallards, chukor and pheasants *(McDowall 1994)*.

Between 1940's & 1960's there was a financial incentive (a 'bounty') to encourage the control of harriers *(McDowall 1994)*.

A Pateke recovery/re-establishment programme has been in operation since the 1960's, but until a comprehensive audit of the whole Pateke recovery programme in 2000 no progress towards saving Pateke from extinction had been made; even though a major captive breeding programme for Pateke had started in 1976 and was extremely successful.

The aim of this paper is to outline the history of the c45-years of continuous effort to save Pateke, the negative and positive outcomes; discuss what is required to save Pateke from premature extinction; to outline the unique characteristics of Pateke, and to reinforce the philosophy that once the unique features of Pateke, their natural history and the reasons why Pateke numbers plummeted from millions in the 1800's to just c800 in 1999, are understood, saving this irreplaceable New Zealand icon and establishing viable breeding populations is a relatively simple exercise *(Hayes 2002 & 2010).*

PREMATURE EXTINCTION

130 bird species have become extinct since 1500 and in 2012 1,300 are threatened with extinction. *(The Red Book 2012)*.

Many researchers have long promoted the philosophy that extinction is a biological certainty and is an intrinsic part of the evolution process, with natural causes being the main route to extinction — earthquakes, eruptions, floods, massive natural environmental changes, competition for food, and so on.

Historically this is very true, but in the past 100 years the path towards extinction for many bird species has undoubtedly been hastened by a massive growth in the world's population and by man's poor respect for the natural environment, for the world's wild animals and birds, together with man's generally abysmal understanding of the environment and how to successfully manage our natural resources.

Nothing could be truer than with the New Zealand situation, where, in 2013, the country holds the world record for having the highest number of endangered birds in relation to its human population; with none of these birds having become endangered by 'natural causes'.

These species have become endangered by mans' *interference* with nature - by introducing predators, by introducing competing bird life, by destroying habitat, by modifying/disturbing habitat and by excessive hunting.

All of these accumulated factors have lead to the precarious state of most endemic bird in New Zealand, with the Pateke population suffering more than any other endemic species of waterfowl.

When coupled with an historic lack of understanding of brown teal ecology, natural history, habitat and food requirements, the effects of predation and hunting, there is little wonder that in 1999, with only c800 Pateke surviving in the wild, the species was on an accelerating path towards extinction.
Extinction is permanent and there is no possibility of re-inventing Pateke once a species has disappeared.
However, with carefully directed and dedicated management, coupled with the technology now available, and with an increasing enthusiasm for retaining the remaining natural environment that still exists in New Zealand, which is undoubtedly still a quality environment compared to most other countries, Pateke and most of our other endangered birds can be saved from what can only be described as *'premature'* extinction *(Hayes 2002)*.

BRIEF NATURAL HISTORY OF PATEKE

Fossil research determined that Pateke have been present in New Zealand for over 10,000 years and that the species was once the country's most populous species of New Zealand waterfowl. Pateke were found throughout all of New Zealand's once vast wetlands and inhabited; lakes, rivers, lagoons, ponds, creeks, forest streams, swamps and estuaries *(Worthy 2002)*.
The 2002 fossil research determinations confirmed what Peter Scott *(Founder of the WILDFOWL & WETLANDS TRUST)* wrote in 1960, that he believed **"Brown teal were an ancient and primitive form of duck"**.
Large Pateke populations were also found on Stewart Island, where the last sighting was in 1972 and on the Chatham Islands, where the last sighting was in 1920 *(Fleming 1982)*.
In 1882 W L Buller wrote **"This elegant little duck is distributed all over the country, being met with in every inland lake and often in the deep freshwater streams which run into them, where the overhanging vegetation affords ready shelter and concealment"** *(Buller 1882).*
With such a large and widespread population the decline of Pateke from millions to a total wild population of just c800 by 1999, is possibly the most dramatic race towards extinction ever recorded, with a graph of the situation showing that Pateke would be extinct by 2004 on Great Barrier Island and totally extinct on the mainland by 2015. *(Hayes 2002)*.
Other results also showed that the exponential rate of Pateke decline on Great Barrier Island would see Pateke totally extinct on the Island by 2005 *(Ferreira & Taylor 2003)*.
In September 1999, two prominent Pateke activists (with over 60-years of continuous Pateke involvement between them) decided to do something about the race towards extinction and both 'featured' on New Zealand's main TV News channel on a Sunday evening, outlining the plight and race towards extinction of what was then one of the world's most endangered birds. Within weeks the NZ Department of Conservation decided to promulgate a formal Audit of the recovery programme *(2000 Audit)*.
The TV News Presenter very succinctly summed up the situation whilst standing in the doorway of a Pateke aviary, stating **"That the recovery programme is really a simple exercise – all that is needed is to provide brown teal with a predator free environment, such as this and they live to 24-years of age."**
The bird to which she referred was a pinioned wild caught female who lived in captivity for 24 years and 3 months and produced broods every year between 1973 and 1988.

There are numerous records of brown teal surviving in captivity for 12, 14, 15 & 17 years *(Hayes 2002)*. By comparison to a c3-year life expectancy of Pateke in the wild *(Dumbell 1987)*, there is a significant 'message' here for Pateke managers!

In the wild a captive reared Pateke male released at the Mimiwhangata Farm Park was known to have been still surviving 8-years later and was 80 kilometres north of its release site when captured and released at the Opua Ferry Terminal, near Russell, whilst cavorting with mallards *(Hayes 2002)*.

The 2000 Audit and the implementation of major predator control programmes has resulted in the race of Pateke towards premature extinction being retarded and the Pateke population is steadily increasing, but this increase has only occurred in the three areas of the country that are now recognised as vital to long-term Pateke survival; these areas are, Northland, Great Barrier Island and the Coromandel Peninsula; such areas also being the areas to which Pateke began their retreat in the c1920 & 30's.

THE RACE TOWARDS EXTINCTION

Pateke became legally protected from duck hunting in 1921 and whilst hunting and wetland destruction played significant roles in the decline of Pateke it was the unrelenting spread of introduced predators that played ***the*** major role in the race of Pateke towards extinction *(Hayes 2002)*.

By c1990 New Zealand had lost over 70% of its natural wetlands through drainage, but there were still vast areas of wetland habitat available to Pateke; however, by the c1930's with the spread of introduced predators, together with duck hunting still in full swing at most wetlands, Pateke commenced their retreat to areas where predator numbers were still low and where there was less hunting pressure; such as Northland, the Coromandel Peninsula and Great Barrier Island *(Hayes & Williams 1982).*

Whilst some historic Pateke habitat remained relatively unmodified the growth of introduced predators initially caused a steady decline in Pateke numbers from the mid-1800's towards the mid-1940's, but from the mid-1940's onwards the exponential growth in predator numbers generated the alarming decline of Pateke towards oblivion.

As already mentioned, by 1999 Pateke were rapidly approaching extinction in the three vitally important areas to which Pateke had retreated *(Hayes 2002);* once thought to be a secure population the Great Barrier Island Pateke population, plummeted between 1987 and 2000 from c1500 in 1986 to just c500 in 2000 *(Ferreira & Taylor 2003)*.

No historic record of Pateke numbers on the Coromandel have yet been found, but in the 1940's Pateke were recorded on both western and eastern sides of the Peninsula *(Hayes & Williams 1982)*.

Prior to the early 1900's there is no record of Pateke being present on Great Barrier Island, and in 1868 Hutton, a highly regarded ornithologist, failed to record them in his extensive Great Barrier Island bird survey *(W.F.Hutton 1868)*.

However, by 1986 there were 1,500 Pateke on Great Barrier Island and 1,200 on the east coast of Northland *(Dumbell 1987)*; with each population surviving in the numerous estuaries and inlets, particularly at the large Okiwi inlet in the northern part of Great Barrier Island, which in 1987 supported c700 Pateke *(Dumbell 1987)*.

With Pateke also present on a number of small offshore islands; including, Kapiti, Urupukapuka, Tiritiri Matangi and Little Barrier the total number of Pateke in the wild in 1987 was c3,000. But, by 2000 Pateke in Northland had declined to c350, on Great Barrier Island to c500 and on the Coromandel Peninsula to less than 20 birds.
The rapid decline in Northland and on the Coromandel Peninsula can be attributed to the spread of predators, but on Great Barrier Island where there are no mustelids, hedgehogs or duck hunting, but large populations of feral cats, two species of rat, feral dogs (lost by pig hunters), Pukeko and the harrier hawk, the race towards extinction can be clearly attributed to an explosion of predators in each of these three areas.
Domestic dogs are also known to successfully eliminate Pateke in these three critically important areas.

CAPTIVE MANAGEMENT OF PATEKE & THEIR RELEASE INTO THE WILD

Efforts to retard the race of Pateke towards extinction started during the 1960's when small numbers of teal were taken into captivity for breeding purposes and in 1968 a release programme commenced, with ten Pateke released on to Kapiti Island; an island just off the west coast north of Wellington *(Williams 1969)*. In the absence of major predators a self sustaining Pateke population existed on the island until 2002 *(Hayes 2002)*. In 2002 six Pateke were removed from the island prior to a major rat poisoning exercise and whilst captive reared Pateke have since been released on the island it is believed that they have failed to re-establish.
The first coordinated captive breeding programme for Pateke was launched by Ducks Unlimited (NZ) in 1975 - **"OPERATION PATEKE"** - (Ducks Unlimited being the first group to use the Maori word for brown teal) - and after a modest start with only four Ducks Unlimited members involved the programme with the introduction of wild caught Great Barrier Island Pateke in 1978 and 1987, together with small numbers from Northland interest grew rapidly amongst Ducks Unlimited members and the programme soon became recognised as the world's most successful captive breeding programme for an endangered waterfowl – with over c3000 reared between 1976 & 2013.
In 1984 when R T Adams MBE became Director of the NZ Wildlife Service he immediately informed the Ducks Unlimited President that he would be handing DU the whole Pateke Recovery Programme, but would be happy to assist with selection of release sites.
At the height of the captive breeding programme Ducks Unlimited had 39 participates spread from Northland to Southland, holding c100 pairs, and c150 Pateke were being reared annually *(Hayes 2002)*.
This highly successful captive management programme has been well documented in literature *(Hayes & Williams 1982 and Hayes 2002)*.
Since 2002 the recovery programme has been totally controlled by a Department of Conservation Pateke Recovery Group.

NEGATIVE ASPECTS OF THE RECOVERY PROGRAMME

Between 1975 and 2002 c2,000 Pateke were released into mainland wetland sites, with all releases failing to slow the species 'race towards extinction', largely because:

- There was a lack of continuity amongst Pateke management personnel and amongst others directly involved in planning the survival of Pateke
- Many sites used were poorly selected
- No pre-release study was carried out to see if there was an adequate food source
- No pre-release study was carried out at any site to determine whether the habitat was suitable
- There was little predator control and little knowledge of the subject
- There was little understanding about which predators were the main predators to control/eliminate
- Until early c2000 no sites had ongoing predator control programmes
- Many sites were out on a limb, with no wild Pateke in the area
- Many sites had no adjacent wetlands for progeny expansion or to which adults could escape
- Many sites had no loafing facilities or aerial protection
- There was insufficient supplementary feeding of released birds. The value of this is recorded in a paper published in 2013 (Jennifer Rickett, et al. Emu, 2013, 113, 62–68)
- Pre-release aviaries were rarely used
- Competing waterfowl were present
- Hybridisation with mallards *(Anas platyrhynchos)* and grey teal *(Anas gracilis gibberifrons)* occurred
- Instant dispersal of released birds occurred
- There was a lack of ongoing support
- There was a lack of monitoring of released birds

POSITIVE ASPECTS OF THE RECOVERY PROGRAMME

The release of captive reared Pateke by Ducks Unlimited (NZ) in the Northland area between 1980 & 1992 did have a number of positive outcomes, particularly at the c350-hectare government owned Mimiwhangata Farm Park during a brief period when predator control was being carried out, pre-release aviaries were used and supplementary feeding took place. 3½ half months after the release of 64 captive reared Pateke at the Mimiwhangata, Farm Park in 1986 all 64 Pateke were believed to be still alive *(Hayes 2002)*.

This 1986 photograph was taken at the Mimiwhangata Farm Park 3 ½ months after a release of 64 Pateke. Over 70 Pateke were present on this created coastal lagoon and it is believed that all 64 Pateke were still alive – thanks to a pre-release aviary, predator control and supplementary feeding. During this 12-year period of Northland releases breeding of released Pateke was recorded at Mimiwhangata, Whananaki and the Purerua Peninsula

KNOWLEDGE GAINED FROM THE EARLY RELEASE PROGRAMME

This 1986 release clearly showed that captive reared Pateke could survive in the wild and much was learnt about Pateke during the Ducks Unlimited captive breeding and release programme in Northland between 1980 and 1996, and it was determined that:

1. **Flock mating/natural pairing of Pateke was the key to the highly successful captive breeding programme – together with the enthusiasm of participants. Flock mating is now being used in a number of rare waterfowl recovery programmes**

2. **Captive reared brown teal adapt readily to a wild environment, whether it is a natural or created**

3. **In Northland captive reared Pateke released at Mimiwhangata, Whananaki and Purerua between 1986 and 1992 survived for long periods and produced offspring – in spite of little predator control, but with predator control Pateke are doing well**

4. **Where predator control programmes have been in operation at suitably selected quality release sites in Northland (and more recently on the Coromandel) Pateke have survived very well and have successfully reared many progeny**

5. **In the absence of waterfowl hunting and predators, captive reared brown teal released into quality Pateke habitat have few problems adapting to the wild**

6. **A gradual transition from captive bred to wild, using pre-release pens and a supplementary diet was successful**

7. **Brown teal are by far the most predator vulnerable species amongst all species of waterfowl**

8. **Captive reared teal released on off-shore islands that have suitable predator-free habitat survive and breed well**

9. **When the release of captive reared Pateke into quality habitat is coupled with predator control, a pre-release aviary, supplementary feeding and with the site having an adequate area for a significant population increase (such as at: Mimiwhangata, Purerua and Port Charles) the recovery process is a very simple one!**

10. **Between 1969 & 1992 it was also learnt that releasing captive reared Pateke at a large number of unsuitable and disconnected habitats, with c35 different sites being used between 1969 & 1992, achieved little, was counterproductive and very expensive.**

11. **Since the Audit of the recovery programme in 2000 steady progress has been made towards increasing the wild populations of Pateke**

Starting in 2009 c150 captive reared Pateke have been released in Fiordland. Pateke were once widespread throughout Fiordland, the habitat is still excellent and with ongoing predator control a South Island population could, in the long term, be re-established.

UNIQUE BEHAVIOUR OF PATEKE

Apart from having to contend with the long extinct Haast's Eagle Pateke evolved in a predator free environment and because of this Pateke have a number of unique behavioural characteristics which are not commonly found in other species of dabbling duck, such as:

- Nocturnal behaviour. It is believed that this trait was historically generated by Haast's Eagle *(Harpagornis moorei)* and that the trait, once termed as crepuscular, expanded as the harrier population grew into millions

- Very selective in pairing behaviour and a monogamous relationship

- Murderous nature of an established captive pair (In 1960 soon after Peter Scott received three brown teal at WWT Slimbridge he said that he hoped New Zealander's were not of a similar nature!)

- The murderous nature of adult pairs in captivity is such that it is impossible to hold more that one pair of teal in an aviary, but birds of the year will live quite happily together until pairing commences – after which a pair must be removed very quickly and place in their own aviary

- The murderous nature of pairs in captivity and in the wild – towards other pairs, their own progeny and towards other waterfowl species

- Long-term parental attention provided to their progeny by both parents, at least until the progeny are fully fledged

- Great climbing ability

- Incredible vulnerability to predation

- Incredible vulnerability to being shot during the duck season – in spite of total protection from hunting since 1921

- Preference (nowadays) for estuarine habitat

- Colour, body shape, size, weight, courtship, displays, and vocal sounds

- Pre and Post-copulatory behaviour - invariably there isn't any!

- Feeding patterns in the wild

- What they eat

- A small clutch size – 5-6 eggs

- Egg shape, size and weight – huge eggs for the size of the female

- Colour, size and weight of progeny

- Specialised bill, with very prominent lamellae

- Flocking behaviour – teal become very gregarious after the breeding season and head for their favourite flock site

- Unique habitat requirements

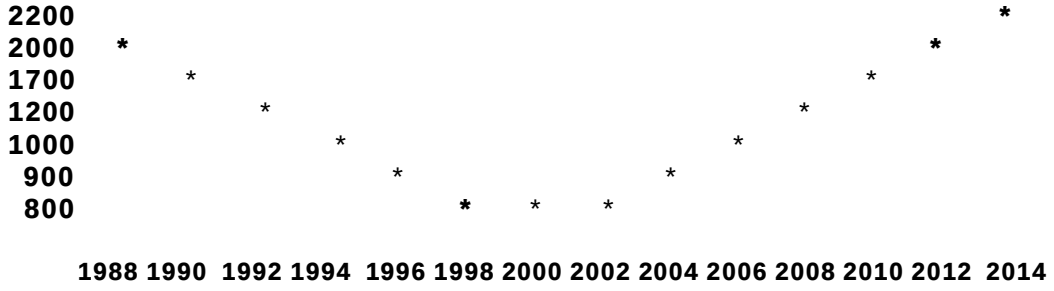
- Preference for walking instead of flying

- Failure to adapt to environmental changes

THE 2000 AUDIT OF THE PATEKE RECOVERY PROGRAMME

As already discussed, in late 1999 the Department of Conservation carried out a major Audit of the Pateke Recovery Programme, into which 39 people with some experience with Pateke had input, and the Audit outcomes were published in 2000.

The 2000 Audit set down clearly defined recommendations and objectives of what needed to be done to save Pateke from extinction there has been a remarkable turnaround - from a total population of c800 in 1999 to a population of c2000 by 2012, with c350 in Northland, c550 on Great Barrier Island, c650 on the Coromandel Peninsula, c200 on off-shore island.



BROWN TEAL POPULATION DYNAMICS FROM 1988 TO 2014

THE RECOVERY MODE

As the population chart shows, there has been significant improvement in Pateke numbers since the 2000 Audit; this has been achieved in three historic Pateke areas of the North Island mainland; at the Mimiwhangata Farm Park, Whananaki, Tutukaka, Ngunguru, and Purerua Peninsula all in Northland region of New Zealand, on the Coromandel Peninsula and on Great Barrier Island - all areas where Pateke were extant in 1999.

The key to the recovery in each area has been the introduction of major predator control programmes, using a variety of trapping techniques, in association with Pateke habitat creation, habitat enhancement, protection and management, no duck hunting, and, in Northland and the Coromandel Peninsula the release of significant numbers of captive reared Pateke.

By 2012 the Pateke population in Northland had risen from c350 in 2000 to c550, but the most spectacular re-establishment has taken place on the Coromandel Peninsula, where, from c20 Pateke in 2000 the population had risen to c650 by 2012.

The recovery on the Coromandel clearly endorses the philosophy that provided Pateke have suitable habitat, protection from predators and ongoing management support they will survive and breed very successfully, with the success on the Coromandel possibly being the most rapid recovery of an endangered duck.

Since the 2000 Audit there has been major predator control and considerable habitat enhancement and manipulation in the Okiwi inlet on Great Barrier Island and Pateke numbers have increased rapidly and the Great Barrier Island Pateke are now in recovery mode.

The dramatic reduction of Pateke on Great Barrier Island, from c1500 in 1987 to just c500 in 2000, was of great concern, as there are no mustelids or hedgehogs on Great Barrier and no duck hunting, a very small human population, and apart from pastoral farming affecting some areas of historic Pateke feeding sites Pateke habitat had changed very little.

The Great Barrier Island situation was quite similar to the historic scenario on the Chatham & Stewart Islands, which also had no mustelids, but where Pateke became extinct on both islands. However, both Chatham and Stewart islands also had high numbers of feral cats, rats, and waterfowl hunting was very popular on the Chatham Islands.

It is believed that lack of Pateke management; habitat changes in some areas of Great Barrier Island, a shortage of Pateke food, together with an almost complete lack of predator control were responsible for the race of Pateke towards extinction between 1987 and 2000.

However, since the 2000 Audit and some dedicated management Pateke numbers on Great Barrier Island had increased to c650 by 2012.

SUCCESS ON THE COROMANDEL PENINSULA

In c1960 the Coromandel Peninsula was a Pateke stronghold, with the top half of the Coromandel Peninsula supporting hundreds of Pateke, but by 2000 only c20 Pateke existed. However, in 2000 it was perceived by the Pateke Recovery Group that there was potential for a Pateke re-establishment programme on the Peninsula.

Pateke habitat was still good on the Peninsula and the re-establishment programme for Pateke on the Peninsula benefited from the highly successful Kiwi predator control programme that was in operation in the Moehau mountain range, which is immediately adjacent to the proposed Pateke release site at Port Charles, at to the top of the Peninsula *(Hayes 2010)*.

The extensive predator control programme in the Moehau Ranges had been in operation since 1999 and by 2014 there are several hundred Kiwi surviving in the ranges. On top of this success, an extensive predator control programme for Pateke at Port Charles and its environs was launched in 2001, resulting in a high level of survival of both released and wild teal.

The release of captive reared Pateke on the Coromandel Peninsula commenced in 2002 and ended in 2007; with a total number of c250 birds being released.

From **c20** to **c650** is an incredible success story and clearly confirmed precisely what the TV Presenter stated in 1999 – “Provide brown teal with a predator free environment and they will live for 24-years”!

The level of survival of released birds, their adaptability and their breeding success, coupled with major predator control programmes, no duck hunting and outstanding support from the local Port Charles community, including many in the farming community, is an outstanding example of what can be achieved in a very short space of time; so much so that brown teal are now being observed in an increasing number in many areas of the Peninsula, with one flock of c180 being counted in 2012 at Waikawau Bay, south east of Port Charles.

Historically, a peninsula has proven to be readily defensible against predators and with ongoing predator control on the Coromandel Peninsula a population of over 2000 Pateke on the peninsula could be achieved.

But besides a well organised and intensive predator control regime on the Coromandel the support of the local farming community and residents around Port Charles has been an intrinsically important part of the success, with a number of land owners creating quality Pateke habitat and the local community carrying out much of the predator control work.

In addition the major financial contributions from Banrock Station Wines of Adelaide, Isaac Wildlife Trust, Ducks Unlimited (NZ), Wetland Care, Dept of Conservation, the Brown Teal Conservation Trust and, critically important to the whole programme - the Pateke captive breeders – all have helped ensure the success of the Coromandel re-establishment programme *(Hayes 2010)*.
Much of the success of the Pateke Recovery Programme since 1999, and the 2000 Audit, has been achieved through:

- Comprehensive and ongoing predator control programmes
- The release of captive reared teal into historic and relatively unmodified habitat in Northland and on the Coromandel Peninsula
- Having wild Pateke in the release areas
- Enhancing and creating habitat
- Habitat management and protection
- Supplementary feeding
- The absence of duck shooting, but at the same time eliminating other species of competitive waterfowl
- Having outstanding community support
- Having a dedicated group of captive breeders to supply the birds needed
- Having the essential appropriate financial backing
- Dedicated management of Pateke habitat on Great Barrier Island, together with a dedicated predator control programme

However, there is still much to be done before Pateke are anywhere near being saved from premature extinction and a future for the species is assured.

RESEARCH

Whilst volumes have historically been published about the plight of Pateke there has been a dearth of dedicated Pateke research to specifically determine such matters as:

- Habitat requirements
- The importance of flock sites
- Food requirements – prior to research results published in 2006 little was known about Pateke diet. This research show that Pateke diet was diverse and included: terrestrial, freshwater and marine invertebrates, fungi, terrestrial and freshwater vegetation, clover, earthworms, caddis fly larvae, beetles, gastropods, and more *(Moore, Battley, Henderson & Webb 2006)*
- Nocturnal activity
- The requirements for population expansion into adjacent habitat
- The value of created habitat
- The value of short to long term supplementary feeding of released birds
- The movement of Pateke between flock sites and elsewhere
- Productivity of released Pateke
- Survival of progeny

In 2002 Trevor Worthy, completed a Pateke fossil research report for the Dept of Conservation, entitled - **"Fossil distribution of brown teal *(Anas chlorotis)* in New Zealand"** *(Worthy 2002).* This invaluable research determined the unique natural history of Pateke and its once widespread abundance in New Zealand.
Prior to this research an outstanding contribution to the understanding of Pateke was made by Grant Dumbell between 1983 & 1987, as part of his Ducks Unlimited (NZ) financed PhD programme, with a thesis entitled **"The Ecology, Behaviour & Management of New Zealand Brown Teal or Pateke"**.
Sadly, much of what was recommended in this research has lain dormant for over 20-years!
In the 2012 edition of Wildfowl 62 (the scientific waterfowl journal of the UK's Wildfowl & Wetland Trust) a paper was published regarding Pateke genetics and entitled "**Captive breeding and release diminishes genetic diversity in Brown Teal *Anas chlorotis*, an endangered New Zealand duck"** concluding that there is insufficient genetic diversity in the current population of captive reared Pateke and recommends that wild mainland Pateke be added to the captive breeding population *(Bowker-Wright, Bell, Ritchie & Williams 2012).*
A three-year research programme aimed at determining habitat usage, habitat preferences for Pateke and their movement between flock sites on Great Barrier Island, commenced in 2012 – using the latest microchip and GPS technology.

THE INVOLVEMENT OF THE BROWN TEAL CONSERVATION TRUST

The Trust was founded in New Zealand in 2001 by the same two activist of 1999 'TV Fame', with the sole aim of sorting out the endless Pateke recovery problems that had besieged the programme for the previous c30-years - and to save the NZ Brown Teal from extinction.
Many believe that the Brown Teal Conservation Trust has made a major contribution to the success of the recovery programme.
The Trust has published widely on what needs to be done to save Pateke from extinction, including, in 2002, the 50,000-word; **THE NATURAL HISTORY, CAPTIVE MANAGEMENT & SURVIVAL OF THE NZ BROWN TEAL** and in 2008 a **REVIEW OF THE BROWN TEAL RECOVERY PROGRAMME**.
One of the key features of the manual was an in-depth section on predators and how to eliminate them.
Sadly, the Trust's existence was destroyed in 2010 by the Department of Conservation – soon after the Trust has laid a formal complaint against one of the departmental appointments to the Recovery Group, and the Trust is now in hibernation.
The Trust published a comprehensive newsletter twice each year.
The 2008 Brown Teal Conservation Trust REVIEW recommended major strategic changes to the recovery programme, the main recommendations being:

- The need to concentrate the recovery programme in – Northland, Great Barrier Island and on the Coromandel Peninsula, where there is excellent Pateke habitat and wild Pateke still exist
- The need for long-term intensive control of all predators at critically important Pateke sites, including: cats, harrier hawk, mustelids, rats, dogs, hedgehogs, pukeko, mallard, duck hunting, and so on (as outlined in the Trust's Management Manual)

- Habitat creation, enhancement, protection and management on Great Barrier Island, in Northland and on the Coromandel Peninsula
- The release of captive reared brown teal , in Northland, on the Coromandel Peninsula and on Great Barrier Island (by 2012 no releases of captive reared Pateke had been made on Great Barrier Island)
- To ensure that the main release sites selected have sufficient food for released teal and their progeny
- The introduction of comprehensive Pateke public education, advocacy and support programmes
- Research relating to the value and importance of Pateke habitat types, Pateke diet and the importance of Pateke flock sites
- The need to eliminate diversionary concepts and misconceptions that have historically detracted from what is a simple species management exercise

The Review also included comprehensive information regarding the selection of release sites for captive reared Pateke, the importance of flock sites for Pateke and many other habitat considerations.
There have been a number of positive outcomes from the 2008 Brown Teal Conservation Trust Review – the Northland Regional Council offered to support predator control programme on any privately owned areas of Northland where brown teal survive; and is now doing this, two conservation trusts in Northland offered support for the release of captive reared teal in their areas, and numerous individuals have offered their support towards major re-establishment programmes in Northland – this is now happening, with wetlands being specifically created near Ngunguru in Northland where small numbers of wild Pateke were still in residence, extensive predator control is now in operation at Ngunguru, Pataua South, Mimiwhangata, Whananaki and on the Purerua Peninsula. Captive reared Pateke have been successfully released at these sites since 2010.

THE NEXT DECADE 2014-2024

With the Department of Conservation having total control of the Pateke Recovery Programme the future survival of Pateke is tenuous, but there are private groups and individuals attempting to ensure that Pateke do not disappear!

(If any reader would like detailed information regarding the Department's incompetence in Pateke Recovery please contact the author)

Of course, there is still much to be done to ensure the long term survival of Pateke, but provided the current momentum of the recovery programme is ongoing – and the recovery efforts in respect of predator control, enhancement, creation and protection of Pateke habitat, plus an all important advocacy programme, with recovery/survival efforts mainly concentrated in Northland, Great Barrier Island and on the Coromandel Peninsula, over the next decade (2014-2024) we could see Pateke numbers in the wild increase to c5,000.

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ILLUSTRATIONS

PATEKE PROGENY – AN ESSENTIAL INGREDIENT TO SURVIVAL OF THE SPECIES

(Courtesy the WAIRARAPA TIME AGE newspaper, Masterton, NZ)

THE ELIMINATION OF ALL PATEKE PREDATORS, QUALITY HABITAT, CAPTIVE BREEDING AND LONG TERM COMPETENT MANAGEMENT IS NEEDED TO ENSURE PATEKE SURVIVAL

THE NGUNGURU INLET NEAR WHANGAREI, NORTHLAND, WHERE SMALL NUMBERS OF WILD PATEKE WERE SURVIVING BEFORE THE RELEASE OF CAPTIVE REARED PATEKE RELEASES STARTED IN THE ARE DURING 2010. BY 2014 INCREASING NUMBERS OF PATEKE WERE PRESENT.
THERE THIS IS A HISTORIC PATEKE SITE

THE WHANANAKI ESTUARY, NORTHLAND - 1985

PATEKE FLOCK SITE AT PAREKURA BAY, NORTHLAND IN 1983.
BY 1995 THIS HISTORICALLY SUCCESSFUL POPULATION WAS EXTINCT

PATEKE ON GREAT BARRIER ISLAND - 1987